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UNITED STATES
DEPARTME T OF
AGRICULTURE

FOREST
SERVICE - RO

REPLY TO: 3400 DATE: May 28, 1987

SUBJECT: Borax Treatment of True Fir Stumps in Timber Stands

TO: Forest Supervisors

Enclosed is a Position Paper, prepared by our Forest Pest Management Group, on the borax treatment of true fir stumps in timber stands.

The Paper was prepared in response to concerns expressed by field personnel regarding Regional direction for boraxing true fir stumps to reduce adverse impacts of anosus root disease. The Paper is self-explanatory. Basically, a Region-wide policy on boraxing true fir is not possible at this time because of a lack of critical information on the disease in true fir stands. Information that is known is presented in the Paper. This information should be used by the appropriate line officer in his decision to treat or not to treat.

Forest Pest Management is available upon request to evaluate individual stands or sites and provide input into the decision process.

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POSITION PAPER

BORAX TREATMENT OF TRUE FIR STUMPS IN TIMBER STANDS

Forest Pest Management is frequently asked if, in timber stands, it recommends treatment of true fir (Abies) stumps with borax (sodium tetraborate decahydrate, EPA Reg. No. 1624-94) to prevent infection of these stumps by Fomes annosus. At this time, we can not recommend this treatment, nor can we recommend not treating. Basically, a lack of information is behind our inability to make a recommendation.

Treatment of all conifer stumps in recreation sites is directed (FSM 2305.14, R-5 Supp. 164) because of the assumed high value of the trees. In timber stands, sufficient efficacy information is available to recommend borax treatment of pine stumps, 8 inches or greater in diameter. Until we have this information for true fir, the treatment decision should lie with the appropriate line officer who has been fully briefed on the specific situation in the particular stand in question.

Following are statements concerning the infection process of F. annosus in true fir which would influence the line officer's decision to treat fir stumps with borax. The statements are summarized in Table 1, and their pertinence to true fir vs. pine presented.

1. All true fir stands in the Region are at risk of infection by F. annosus. That is, given a fresh wound in a true fir stem or a fresh stump surface, there is a risk that it will be infected by F. annosus. The following information and observations support this statement:

   a. F. annosus is widely scattered throughout the Region in true fir and mixed-conifer stands (3, 5, 6, 11, 12).

   b. The presence or absence of F. annosus in a stand appears to be related to stand history and to individual stand characteristics which will change with time (5). For example, older stands and stands which have been entered have a higher probability of having annosus root disease.

   c. Spores of F. annosus are present in all true fir stands at all times of the year (Cobb and Smith, unpublished).

   d. Stump surfaces of true firs are readily infected and colonized by F. annosus (10).

2. Forest management activities (stand entries) tend to increase the risk of increasing the levels of F. annosus infection in true fir. This statement is supported by the following:

   a. Statewide surveys of true fir have found a positive correlation between the number of stand entries and the presence of F. annosus infection of true fir (5).

   b. This association has been confirmed in the process of conducting biological evaluations of pest problems in stands containing true fir.

   c. Surveys of true fir wounded during stand entries found that some of these wounds were colonized by F. annosus (1, 2, 8).

   d. The increase in the number of stumps created during forest management activities has the potential to result in increased F. annosus infection in the residual stand.

3. Once a true fir site becomes infested with F. annosus, it may stay infested for many rotations if it is repeatedly regenerated to true fir. An alternate crop of pine or brush appears to reduce the incidence of F. annosus on a particular true fir site (5).

4. Borax treatment of true fir stumps will effectively prevent the infection of stump surfaces (10). However, the efficacy of this treatment in reducing the impact of the disease in a stand has not been pilot tested.

5. Borax treatment of true fir stump surfaces will not prevent the entrance of F. annosus into the root systems of true fir stumps or entrance by other means, nor will it eradicate existing root or stump infections present at the time the tree was cut.

6. F. annosus can enter the true fir in a stand by means other than through fresh stump surfaces. This conclusion is supported by the following:

a. Fomes annosus is found in association with fire scars in virgin true fir stands (L. A. Paine, unpublished).

b. Studies of logging wounds indicate that F. annosus is a colonizer of these wounds (2).

c. Field observations indicate that mycelial infection of root systems of adjacent trees occurs through the spread of F. annosus from one root system to another.

7. True fir stands are often infested with F. annosus before harvest entry. This infestation and the level of infection is difficult to detect and determine because infection in true fir usually results in a heartrot (4) with no above ground crown symptoms produced.

8. The spread of F. annosus by root contact from true fir to pine is rare. Therefore, even if stump surface infection of true fir occurs, it may not affect adjacent pines in the stand. This statement is based on observations in mixed conifer stands (3), on survey data (7; Parmeter and Slaughter, unpublished) from pine plantations established in red fir or mixed conifer stands throughout the northern, central, and southern Sierra, and on laboratory evidence demonstrating different strains of the fungus on pines and on true fir (9).

Information Needs

The above statements have identified the following information needs:

1. What are the levels of F. annosus spores in various forest types, over a wider area of the Region, and during more frequent periods of the year?

2. What is the frequency of true fir stump infection by forest type, location, and season?

3. What is the long term effectiveness of borax treatment of true fir stumps, under various forest types and geographic locations, in reducing incidence of annosus root disease in managed stands?

4. More accurate methods of determining levels of F. annosus infection in true fir and mixed-conifer stands are needed.

5. What is the relationship between infection of true fir stumps and damage to surrounding true firs, especially following partial cuts, to the economical and biological benefit of borax treatment?

Table 1. Statements concerning annosus root disease in forest stands of California.

Statement	Pine	True Fir
1. All stands Region-wide are at a risk of infection.	+	+
2. There is a positive correlation between the number of stand entries and levels of infection.	+	+
3. Once a stand is infested, it may stay infested for many generations if regenerated with the infected host.	+	+
4. Borax treatment of freshly-cut stump surfaces will effectively prevent infection of the stump surfaces.	+	+
5. F. annosus enters only through freshly-cut stump surfaces.	+	-
6. The efficacy of borax stump treatment in stands has been determined.	+	-
7. Level of infestation in a stand is generally visible because root infection produces above ground symptoms.	+	-
8. The spread of F. annosus by root contact to other conifer species is common.	+	-

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